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**From:** Dunn, John  
**Sent:** Mon 1/9/2017 9:10:54 PM  
**Subject:** Labadie Heat Modification Request  
[Area Behind Wing Dams.png](#)

Chris, Jake,

I said I would put together a quick list of EPA's concerns with the Labadie proposal for a permit modification.

EPA has reviewed model results compared to instream data sets. Even though some of this data is over 10 years old, this was the first time we are aware of access to them.

While the models appear predictive, we are concerned with the outputs contained in the data sets and the associated models runs. Specifically, it appears that the portion of the mixing zone (MZ) exceeding + 5°F ( $\Delta T = +5^{\circ}\text{F}$ ,  $+2\ 7/9^{\circ}\text{C}$ ) extends beyond the sampled or modeled data under low flow conditions (July 2003, August 2003, and January 2004). Thus, the MZ extends over one mile in length under low flow conditions. MDNR's thermal criteria allow for MZ "lengths and widths" to be "determined on a case-by-case basis and shall be based on physical and biological surveys when appropriate." The data and modeling provided do not give the MDNR the information needed to assess the length of the + 5°F MZ under low flow conditions, so the MZ length being requested by Ameren is not clear.

MDNR criteria also require a "cap" on the temperature at the end of the MZ. Temperature at the end of the MZ "shall not cause or contribute to stream temperature in excess of ninety degrees Fahrenheit (90°F)." Background river temperatures can approach 90°F in hot summers. Table 3 in the Thermal Plume Modeling submitted by Ameren shows a maximum recorded river temperature of 89°F. The upper 99<sup>th</sup> percentile of background temperature (about 3 days per year on average) is 87.1°F. Observation of Missouri River data shows that the combination of heat and drought can create the combination of low river flows and high background temperature. This is also the period when electrical demand is high. As above, the modeling provided does not give MDNR the information needed to assess the length of the 90°F MZ under low flow heat events.

It is unclear from the Thermal Plume Modeling study how Ameren is assessing the width of the MZ. The study seems to suggest that the 25% cross section of the river is based on a measurement from the wing dam line to the far bank of the river. The area behind the wing dams should also be considered as part of the river channel and the mixing zone. The habitat within the pools between the right descending bank and the wing dams is a significant amount of habitat. Modeling runs showed that temperatures in the MZ are highest in the areas behind the wing dams (See Transect 8 in various modeling runs – note that the transects had different lengths in some of the original data collection – so T8 does not always equal T8). As an estimate of spatial extent, the area of habitat contained by the wing dams in a mile long MZ is about 50 acres (see attachment). With the true length of the MZ is determined, as mentioned above, the affected area would be larger. Note that there are several points in the MZ where the width of the river between the right bank and the wing dams is more than one fourth of the width of the river bank to bank. This should be considered in terms of cross-sectional area as required by MDNR rules.

MDNR needs more information in order to evaluate Ameren's request. EPA suggests modeling to find the length of the  $\Delta T = +5^{\circ}\text{F}$  MZ under a low flow condition (this could occur in summer or winter). EPA suggests modeling of the length of the MZ under conditions of full power production, low flows, and high background temperatures, as has occurred during summer heat events. MDNR should seek a clarification of the assessment of "twenty-five percent (25%) of the cross-sectional area" of the river at various places along the MZ as defined by bank to bank measurements and the modeling runs above.

--JD

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